

**IN THE SPECIFICATION:**

1) Please replace ¶ [0020] with the following amended paragraph:

[0020] We then apply this to the bias estimation to get sequential estimation of state-dependent biases. We introduce a state-dependent bias  $l_j$  attached to each state  $j$ , we express the Gaussian power probability density function (pdf) of the state  $j$  mixture  $m$  as

$$b_{jm}(o_t) = N\left(o_t; \mu_{jm} + l_j, \sum_{jm}\right) \quad (5)$$

$$= \frac{1}{(2\pi)^{\frac{n}{2}} \left| \sum_{jm} \right|^{\frac{1}{2}}} e^{-\frac{1}{2}(o_t - \mu_{jm} - l_j)^T \sum_{jm}^{-1} (o_t - \mu_{jm} - l_j)}$$

2) Please replace ¶ [0023] with the following amended paragraph:

[0023] Ignoring the items that are independent of  $l_j$ 's we define Q-function as

$$Q_{k+1}(\Theta_k, l_j) = \sum_{t=1}^{T^{k+1}} \sum_j \sum_m P(\eta_t = j, \varepsilon_t = m \mid o_t^{T^{k+1}}, \Theta_k) \log b_{jm}(o_t) \quad (7)$$

$$= \sum_{t=1}^{T^{k+1}} \sum_j \sum_m \gamma_{k+1,t}(j, m) \log b_{jm}(o_t) \quad (8)$$